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Correspondence

A tribute to Lotfi A. Zadeh

1. My first meeting with Zadeh at Columbia University

It is indeed a pleasure and honor for me to pay tribute to my dear friend Lotfi Zadeh on the occasion of his 90th birthday. I first met Professor Zadeh when I was a doctoral student at Columbia University. During the Fall of 1989, I took his course on network theory. He never brought notes to his lectures, which was a demonstration of his mastery of the course, and he was also very attentive to student questions.

Although my doctoral supervisor was Dr. John Ragazzini, Professor Zadeh was very helpful to me in suggesting pertinent references and by encouraging me to choose the subject of sampled-data systems as the topic of my research work. I was continuously in contact with him regarding my doctoral degree research work and, after completing my thesis and receiving the degree of Doctor of Engineering Science, I left Columbia to take up a position at the University of California at Berkeley.

Professor Zadeh left an indelible mark at Columbia, and the impact of his work at Columbia is well documented in many articles [1] including a recent article by Kamal Premaratne [2].

2. My association with Zadeh at the University of California at Berkeley

Professor Zadeh left Columbia in 1959 to join the faculty of the University of California at Berkeley. This is where I crossed his path again. At Berkeley, he was first a faculty member and later he served the department as its Chairman for about five years. During his stay at Berkeley, two major events happened in his life.

The first event is that, recognizing the importance of computers, he prevailed to change the name of the department to the Department of Electrical Engineering and Computer Science (EECS). This change influenced many universities in the USA to make a change to the same or a related name. As things stand now, in the USA, three names are commonly used: EECS, Electrical and Computer Engineering (ECE), and the original Electrical Engineering (EE). The impact of this change that occurred at Berkeley is recognized by the engineering community as a major important event.

The second major event is his introduction of the notions of "fuzzy sets and fuzzy logic". Over the last 25–30 years, this area of fuzzy logic has developed into a revolutionary field in engineering and science. Many books and articles have been written on this subject. I consider this the crowning achievement of Professor Zadeh.

In 1981, I left Berkeley to join the University of Miami, while Professor Zadeh continued his tenure at Berkeley. When he retired, he received the title of Professor in the Graduate School, where he is still quite active.

3. Our relationship after my retirement from the University of Miami

After I left Berkeley, he visited us in Miami on two occasions.

The first time, he was invited by the Department of Mechanical Engineering for a lecture. The second time, we were fortunate to have him deliver the Jury Lecture in 1998. During both occasions, we benefitted greatly from his lectures. From time to time, I also get news about Lotfi Zadeh from our mutual friend, Mo Jamshidi.

4. Conclusion

In concluding my brief account of Professor Zadeh, I consider him a visionary scientist and educator, with many ideas ahead of his time.

On the very happy occasion of his 90th birthday, I want to wish both Lotif and his wige, Fay, a long life, full of health and happiness. It gives me great pleasure and it is an honor to have been his friend and colleague for the last 61 years.

References

[1] Columbia University Electrical Engineering History. Postwar period: The golden era of systems and control theory. Columbia University, The Fu Foundation School of Engineering and Applied Science, Electrical Engineering Department. [Online]. Available: http://www.ee.columbia.edu/pages/deptoverview/history/index.html.

[2] Premaratne, K. "Eliahu I. Jury", *IEEE Control Systems Magazine*, 30(1), pp. 72–77 (2010).

Eliahu (or Eli) Ibraham (or Abraham) Jury was born in Baghdad, Iraq, in May 1923. He studied at the Elementary School in Baghdad (called Wattanyiah) until the age of thirteen (1936) when he moved into the Government Public School where he studied until 1939. In 1940, during the Second World War, he was denied admission, because of his Jewish faith, into the Government

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Secondary School. So, during the year 1940, he went to study in Basrah. For the last secondary school year, he returned to Baghdad to study in a private school. During 1941, he took the Secondary (Baccalaureate) exam which he passed with excellent credentials.

After the secondary education, he left Iraq, for the last time, to study Philosophy and Economics at the American University of Beirut (A.U.B.) for one year. He passed the courses at A.U.B. with honors. In 1942, he moved to then Palestine to study Electrical Engineering at the Technion-Hebrew Technical College (now, Technion-Israel Institute of Technology) where he was a Goldberg Scholar. In 1947, he obtained the Diplome Engineer (E.E.) degree in the field of Electrical Engineering.

On November 01, 1947, he arrived in the United State of America (USA) to study at Harvard University, Cambridge, Massachusetts, for the degree of Master of Science in E.E. He obtained the M.S. degree in 1949 from Harvard University, and the Sc.D. degree in Engineering Science from Columbia University, New York, New York, where he was a Higgins Fellow, in 1953.

After a six month stay at the Electronic Research Laboratory of Columbia University in 1953, he joined the Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, as an Instructor in 1954. He was appointed Professor of Electrical Engineering in 1964, the position he held until June 30, 1981. During 1958–59, he was Visiting Professor at the University of Paris, Paris, France, and at the Swiss Federal Institute of Technology, Zürich, Switzerland. During 1964–65, he was Visiting Professor and Senior NSF Postdoctoral Fellow at the Imperial College of Science and Technology, London University, London, England. In 1970, He was Visiting Scientist at DFVLR Institute of Dynamical Systems in Oberpfaffenhofen, Germany. During the Fall of 1973, he was Visiting Professor at the University of Rome, Rome, Italy. He was a Visiting Professor and Senior Postdoctoral Fellow at the University of Newcastle, New South Wales, Australia, during the Fall of 1975. In the Fall of 1978, he was Visiting Professor at the Swiss Federal Institute of Technology, Zürich, Switzerland. He received an award in the Distinguished Professor category as a Fulbright-Hayes Fellow to lecture at the Kiev Polytechnic Institute, Kiev, USSR, in September 1979. He served as a Consultant to Bell Telephone Laboratories, Convair, San Diego, in June 1957, and as a Principal Research Supervisor at Berkeley to the Air Force Office of Scientific Research and National Science Foundation for over thirty years.

During his tenure at Berkeley and Miami, he supervised about 30 Ph.D. and about 50 M.S. candidates who since have assumed positions of leadership in both universities and industry. He has authored over 265 research papers in well known journals such as IEEE Proceedings, IEEE Transactions, Journal of the Franklin Institute, ASME, ISA, SIAM Journals, International Journal of Control, Automatica, Linear Algebra and Applications, Quarterly of Applied Mathematics and others. These research papers and notes span into many areas including sampled-data control systems, operational methods, z-transform theory, circuit theory, digital filters, bioengineering, stability theory, inners theory, multidimensional systems, certain aspects of communications theory as exemplified in pulse-width and pulse-frequency modulation schemes, robust systems, etc.

He is the author of Sampled-Data Control Systems (New York: Wiley, 1958; Malabar: Kreiger, 1977) which was translated into French, Japanese, and Russian, Theory and Application of the z-Transform Method (New York: Wiley, 1964; Malabar: Kreiger, 1973, 1982, 1986) which was translated into Polish, and Inners and Stability of Dynamic Systems (New York: Wiley, 1973; Second Edition, Malabar: Kreiger, 1982) which was translated into Russian.

Dr. Jury served in many committees both at Berkeley, including the Department Research Committee, the University Senate Committee, the College Fellowship Committee, and during the last two years of his stay as Vice-President and President of Sigma-Xi Society of the University of California, and nationally, including membership in AIEE Committee on Feedback Control Systems (1956–1961) and AIEE Committee on Industrial Electronics (1957–1961), representative for Automatic Control at Wescon Meeting, San Francisco (1961), and a member of the US Scientific Exchange visit to the USSR (1965). He was chosen to serve as Chairman of IEEE Fellow's Committee, East Bay Section (1978–1979). He served as a member of IEEE Automatic Control Society's Awards and Fellow Nomination Committee (1981). He also served in the Selection Committee for Distinguished Faculty Scholar Award at University of Miami (1989–1993).

He is a member of the New York Academy of Sciences, Tau Beta Pi, Eta Kappa Nu, and an honorary member of Sigma Xi. He is listed in American Men Science, Dictionary of International Biography, Who's Who in America, and Who's Who in Engineering. In June 1977, he delivered the Routh Centennial Lecture at the IEE Headquarters in London, England. In August 3 1980, he received the ASME Centennial Medal for his contributions to control systems.

In July 1981, he was designated as Professor Emeritus at the University of California, Berkeley, and then he joined the Department of Electrical and Computer Engineering, University of Miami, Coral Gables, Florida, as Research Professor.

He was awarded an Honorary Doctor of Science Degree by the Swiss Federal Institute of Technology, Zürich, Switzerland, in November 1982. He received the First Education Award of IEEE Circuits and Systems Society in 1986, the Rufus Oldenberger Award of the American Society of Mechanical Engineers in 1986, and the First Distinguished Faculty Scholar Award of the University of Miami in 1988. In 1991, he received the Phoebe Apperson Hearst Medal from the University of California, Berkeley, and in 1992, he was inducted as an honorary member of Phi Beta Kappa. The same year, he was awarded the University of Rome medal. In 1999, he received the Egleston Medal for his outstanding contribution to the profession of engineering. This is the highest award given by the Columbia University Engineering School Alumni Association. In the same year, he also received the IEEE Circuits and Systems Society's Golden Jubilee Medal. He has also received the IEEE Millennium Medal in 2000, an Honorary Fellow Degree from the Technion in 2001, and the IEE's Mather Premium in 1994 and the Heaviside Premium in 2002.

He became a Life Fellow of the IEEE in 1989. Since 1988, he is a Research Professor Emeritus of the Department of Electrical and Computer Engineering, University of Miami, Coral Gables, Florida.

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